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MANUFACTURING INSTALLATION FOR FLAT-SHAPED PRODUCTS

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[Abstract]

The invention concerns a manufacturing installation for flat-shaped products (2), in particular for disposable diapers for babies and incontinent people.

The installation (1) constitutes successive work stations (11-29) arranged in-line in which one forms, from various spooled base-material cloth (3-8), a continuous composite strip suitable for obtaining the products (2).

Moreover, according to the invention, it comprises a means to control the advancement of the base-material cloth (3-8), a means to control in a synchronous manner the advancing composite strip (40) thus formed, according to the shape and quality parameters of the product to be obtained (2), a means to mark, according to the rate "p," the obtained products not conforming to said parameters, and a means to eject the marked nonconforming products obtained after they have been cut.

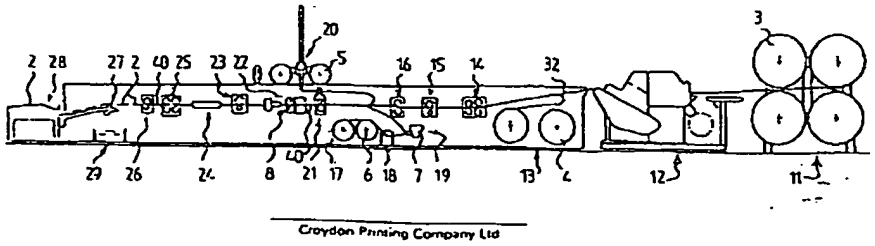


Figure 1

The invention concerns a manufacturing installation for flat-shaped products, in particular for disposable diapers for babies or incontinent people.

In particular, its use will be, on the one hand, in the creation and construction of such an installation, and on the other hand, in the area of production-line manufacture of flat-shaped products, particularly but not exclusively disposable diapers for babies or incontinent people.

Indeed, in many areas of industrial manufacturing, one strives to optimize production and to reduce the cost of manufactured products. This is particularly the case in the manufacture of so-called disposable or single-use articles. This last criterion obligatorily imposes the sale of manufactured products at the lowest possible price for the consumer, who therefore will prefer it through convenience to identical products that are more expensive but reusable.

In recent years, technological development has enabled the mechanization and automation of many product-manufacturing installations. These technological improvements have put products on the market that have existed for a long time in reusable form and which really meet the needs of the modern consumer thanks to their disposable nature.

This is especially the case in the area of hygienic protection for babies and incontinent people. Indeed, for this type of protection one uses absorbent diapers, which formerly were made from traditional textile materials. Then, they appeared in the shape of simple, usually rectangular diapers, constituted by cellulose fibers and kept on the individual by a piece of textile made from plastic material.

The convenience of using such types of disposable products and their commercial success forced the industry to make their manufacture more sophisticated. This is why one has seen the appearance of such composite flat-shaped products known as "pull-on diapers or disposable diapers."

These new products offer the advantage of regrouping all the functions in one product, namely: comfort for the individual, efficient absorption, watertightness and humidity control. This is why they are all the more appreciated by consumers and users for their convenience. However, such improvements significantly increase the price of products made in this way.

To minimize the price, manufacturing installations for such continuous-strip products have been created, constituted by different successive work stations arranged in-line for continuous work and which, from diverse base materials supplied to said installation, yield a composite flat-shaped product in completely finished form at the end of the line.

Indeed, it is well-known that flat-shaped product manufacturing installations, in particular for disposable diapers for babies or incontinent people, are constituted by different successive work stations suitable for forming, for example from spooled base-material cloth, a continuous composite strip with at least two external layers, namely one continuous layer that is

watertight against liquid and one continuous layer with a comfortable feel on the skin, and with one element, in the form of a pad, permeable and absorbent, placed between the so-called external layers at regular intervals.

Next, the two external layers and the pad are joined together to give coherence to the strip and the flat-shaped products are finished at the end of the installation by cutting the continuous strip between each pad element.

Such installations can operate at the rapid rate of 200-300 products per minute, but the quantitative production and the quality of the finished product still depend strictly on the reliability of the implemented means in the known installations. As quality is paramount in the eyes of the customer and the user, it is common to locate manual inspection points at the end of the line to eliminate, before packing, those manufactured products which do not meet quality criteria or which are defective.

Indeed, whatever expectations one has for the creation of such manufacturing installations, as much on their operating principle as on their means, certain operating parameters of the installation will make certain products show defects or anomalies at the end of the line. The latter will have diverse causes and one will create, for example, nonconforming finished products in the following cases.

When the installation is put into service, or more exactly, each time the line is restarted, the advancing speed of the continuous strip passes from zero production to the theoretical production threshold, between 60 and 100 products/min.

When the installation is in operation, the first base materials generally appear in spools, and when the spools are changed, there is a recovering of the cloth material, which

causes excessive thickness at the fabricated product level; for example, this can be produced on the watertight external layer or even on the external comfort layer.

Other quality or shape defects can also appear in the course of manufacturing, for example a shift in the continuous spooling of the strip in regard to different stations, which will cause lateral shifts at the level of the finished product; a shift in the final transverse cut, which will cause bad positioning of the pad element in relation to the lateral sides of the product, and poor shaping of the absorbing element.

Moreover, in the specific case of disposable diapers, it is common to affix elastic from one part of the pad element to another to obtain gathers and so that the finished product conforms to the shape of the individual while protecting against leaks. This elastic is generally in the form of a flat strip glued on the external watertight diaper. This is why in the course of manufacturing this elastic can turn over or even be poorly glued. These two disadvantages are other quality defects.

Finally, in the specific case of disposable diapers, it is still common to affix adhesive tapes from each lateral side to a very precise position to make sure the diaper stays on the individual. These adhesives are of the utmost quality criteria because when the adhesives are missing or poorly positioned, a diaper will ultimately not be suitable for use.

It is very common with current well-known systems for applying adhesives for the latter to be poorly positioned or even not affixed.

Moreover, to lower the current price, it is important, on the one hand, to reduce the defect causes and, on the other hand, to even significantly increase the rate of production.

If one can minimize the defect causes while creating an installation in accordance with the most reliable techniques, manual inspection of products at the end of the line, on the contrary, limit the rate or in the case of the highest rates, necessitate more significant labor.

The objective of the present invention is to propose a manufacturing installation for flat-shaped products, in particular for disposable diapers for babies or incontinent people, which may remedy the problems outlined above, while proposing an automatic inspection system of the different manufacturing phases with the end-line ejection of nonconforming products, before they are packed.

Another objective of the present invention is to propose a manufacturing installation for flat-shaped products, in particular for disposable diapers for babies or incontinent people, which makes certain manufacturing operations more reliable, particularly the positioning of adhesives.

One of the objectives of the present invention is to propose a manufacturing installation for continuous strip products, which inspects the product during its manufacture in accordance with shape and quality parameters, to obtain in the end first-rate products which do not have excessive thickness of materials at the level of the external layers nor defects, at the level of the absorbent pad, in shape or positioning, but on the contrary have a controlled geometric configuration, good coherence, and well-positioned adhesives and elastics.

Other objectives of the present invention will appear in the course of the subsequent description, which is however only given as an indication and does not intend to be limiting.

In accordance with the present invention, a manufacturing installation for flat-shaped products, in particular for disposable diapers for babies and incontinent people, constituted by different successive in-line work stations and comprising at least:

-the means to form, from various spooled cloth-based materials for example, a continuous composite strip with at least two external layers, namely one continuous diaper that is watertight against liquid and one continuous diaper with a comfortable feel on the skin, and with one element, in the form of a pad, permeable and absorbent, placed between the so-called external layers, in accordance with a predetermined rate "p,"

- the means for joining at least partially the two external layers and said absorbent element between them

is characterized by the fact that it comprises:

- the means to inspect the unspooling of the base-material cloth,

- the means to control, in synchronous manner, the advancing composite strip thus formed, located at different work stations along the installation, in accordance with the shape parameters and the quality of the product to be obtained,

- the means to mark, in accordance with the rate "p," the obtained products nonconforming to said parameters,

- the means to cut the continuous strip thus-formed, in accordance with the rate "p," to produce flat-shaped products,

- the means to eject, after cutting, the marked nonconforming products.

In accordance with the different characteristics of the present invention one will eliminate the following irregularities from the line:

- products without adhesive and/or poorly positioned adhesive,

- products formed during transitory periods of operation of said installation,

- products with an excessive thickness of the external layers,

- products in which the elastic is turned over or not glued,

- products with an excessive thickness and/or a local absence of material at the level of the internal absorbent element,

- products not symmetrical in the transverse direction,

- products with an absorbent element poorly positioned in relation to the longitudinal ends of the product.

The invention will be better understood after reading the following description accompanied by the attached diagrams, which are an integral part of it.

Figure 1 is a schematic representation of a manufacturing installation of flat-shaped products illustrating the succession of different in-line work stations.

Figure 2 is shows a flat-shaped product, such as a disposable diaper for babies or incontinent people, obtained via an installation of the type in Figure 1.

Figure 3 shows the disposable diaper represented in Figure 2 in its folded form for packaging.

Figures 4a-4e show different successive stages of manufacturing of the disposable diaper represented in Figure 2.

Figures 5a-5c illustrate the stages of the positioning of adhesives created by the installation of the present invention.

Figure 6 is a schematic representation of the continuous strip viewed from below and clearly demonstrates the checking for

the presence and positioning of adhesives according to the present invention.

Figure 7 shows a detail of the installation of the present invention which clearly demonstrates the operation of the installation when the spools of the base materials are changed.

Figure 8 shows the end of the manufacturing line, in detail and in particular illustrates the cutting, the ejection of the nonconforming products, and the removal of the finished products.

The objective of the invention is a manufacturing installation for flat products of composite form. It is particularly suited to the manufacture of disposable diapers for babies or incontinent people but more generally it is applicable to the manufacture of hygiene products and the like.

As was restated in the introductory part of the present application, it has become more common to use such products which are conceived for single use and are therefore disposable. This allows, for example in the case of diapers or pilches for babies or incontinent people, convenient use since it does away with maintenance and fastidious washing, all while offering a reasonable price.

Nevertheless, to lower the price of such products, it is necessary to make them in a reliable manner and to produce them as automatically as possible while avoiding rejects as much as possible.

Moreover, to avoid manual inspection at the end of the line, which has serious repercussions on costs, it is worthwhile to set up an installation whose inspections are done automatically, causing rejection at the end of the line of marked nonconforming products.

Figure 1 is a schematic representation of a manufacturing installation for flat-shaped products, in particular for disposable diapers for babies or incontinent people. This installation 1 creates said products 2 from various base materials through in-line treatment in different successive work stations.

For a better understanding of the remainder of the description, we are going to describe beforehand the constitution of a non-limiting example of flat-shaped products, a disposable diaper such as represented in Figure 2. This diagram only illustrates one type of product; the shape of the final product and the characteristics can naturally be adapted as needed by a person skilled in the art.

Disposable diaper 2 is essentially constituted by an element 10 that is permeable and absorbent and placed between first external watertight layer 6 and a second layer 5 which is permeable and has a comfortable feel on the skin of the individual.

More precisely, the absorbent element 10 is made from cellulose fibers 3 and surrounded with a net of cellulose fibers 4 which assures the cohesion of element 10. As for the external layers, layer 5 in particular is made on a nonwoven material, for example that with a polypropylene base, which has a favorable feel. In addition, the watertight layer 6 is favorably constituted by a polyethylene film of a thickness that it may be resistant to mechanical and elastic stress.

In addition, disposable diaper 2 has elastic 7 situated on both sides of absorbent element 10 on its lateral sides to create gathers at the individual's crotch area. According to production methods, the elastic can be either of rubber or polyurethane and

fastening it to the watertight polyethylene film 6 would be advantageous.

Finally, on the transverse sides of disposable diaper 2 there is an allowance for the length of adhesive tape 8 refolded on itself on both sides. The characteristics of this adhesive is determined by the person skilled in the art, so that it might be, for example, of the type that is totally removable while being able to be joined to the elements.

Figure 3 shows disposable diaper 2 such as described above, folded a first time into a C shape, then a second time in two to occupy a minimum space and for the advantages of storing and wrapping.

Such a type of diaper can be made in an installation 1, such as represented in Figure 1, which in this respect successively comprises the following different stations.

a) A paper pulp feed station for receiving, in particular, 3 or 4 spools of paper pulp 3 which constitute the base material of the absorbent pad,

b) A fiber separation station 12 supplied from pulp spools 3, equipped with a mechanism of the hammer-grinder type, for example.

After separating the fibers from the pulp, one forms the absorbent cloth by using scarifier mechanisms designed to produce a cloth whose thickness is favorably larger in the center than at the ends to improve absorption for a given mass of fibers.

Figure 4a is a schematic representation of the shape of the absorbent fiber cloth form 30 advancing toward scarifier mechanisms 31 adapted to the shape of the pad which on exit gives a strip formed of absorbent cloth.

c) A spool station 13 of a net of spooled cellulose fibers intended to consolidate the absorbent cloth delivered at the outlet of station 12.

More precisely, at this point, the absorbent material cloth is deposited on cellulose net 4 which is, for example, transported on an inclined plane and is next subjected to folding in three lengthwise directions so that the net surrounds the fibrous material to give coherence to absorbent element 10.

d) A stamping station 14 towards which is next directed the advancing strip formed by the cloth of fibers enveloped in said net to imprint on the latter a diamond stamp, which will advantageously allow an optimized absorption of the liquid through pad element 10.

e) A station 15 for the anatomical cutting of the absorbent element, such as illustrated in particular in Figure 4b.

Therefore the cloth 32 of fibers surrounded by the consolidation net is directed towards a set 33 for cutting into small pieces constituted of at least one cylinder knife 34 and a counter-cylinder anvil 35.

One should note that the rotating knife is designed specifically according to the dimensions of the product and more precisely, the extension of this knife corresponds to the length of the pad to be manufactured.

f) An element cutting station 16 comprising in particular a rapid straight cutting blade, for each size, one defines said absorbent element unit 10.

g) A base material feed station 17 substantially constituting the watertight external layer which comprises in particular essentially two spools onto which a polyethylene film such as defined beforehand is rolled.

h) A gluing station 18, schematically detailed in particular in Figure 4c, which coats the watertight film 6 to adhere the back of the absorbent element 10 to this film.

According to an embodiment, one makes use of a multifeature gluing nozzle 36 which applies fine traces of glue lengthwise and essentially parallel on one of the faces of the polyethylene film 6.

i) A station for laying down elastic 19 in which elastic 7 is taken from each side of absorbent element 10.

The elastic is then joined to the polyethylene film, either by a separate application, or by using the multifeature gluing described above.

j) A base material feed station 20 substantially constituting the external layer 5 with a comfortable feel, which comprises in particular two spools for directing the nonwoven cloth toward the advancing continuous strip until shaped by polyethylene film 6 on which absorbent elements 10 are periodically located according to a rate "p."

k) An end-sealing station 21 whose objective is to form a continuous composite sandwich strip which will form the back base of disposable diaper 2.

Indeed, as described above, the absorbent element units are deposited on watertight polyethylene film 6 which covers elements 10. The nonwoven cloth 5 is directed over the other face of pad elements 10 so that the latter are sandwiched between the two external layers respectively formed by film 6 and nonwoven cloth 5.

It should be noted that watertight film 6 and nonwoven cloth 5 have similar linear speeds, [which are] however, greater than

those of arriving pad elements 10 to create the rate "p" between each pad element 10.

In this station 21 an anatomical press 37 constitutes a cylindrical press 38 with a profile adapted to the pad element and a smooth anvil cylinder 39 whose speeds of rotations are synchronized to the advancing speed of the composite strip.

Therefore, anatomical press 37 compresses each interval between stamp element 10 and the edges to assure sealing of nonwoven cloth 5 on polyethylene watertight film 6 thanks to the multifeature gluing previously deposited. Figure 4d in particular illustrates this operation and the oblique section lining surrounding the pad element illustrates the compressed and sealed parts between them.

At this level, one has formed, thanks to different measures which have just been described, a continuous composite strip 40 with at least two external layers, namely continuous layer 6 that is watertight against liquid and continuous layer 5 offering a sensitive feel on the skin, and with a permeable and absorbent form element 10 placed between the two said external layers 5 and 6 according to a predetermined rate "p." Moreover, external layers 5 and 6 and said absorbent element 10 are joined at least partially to one another to assure a good coherence of advancing strip 40.

l) A station for the application of adhesives 22 in which two lengths "l" of tape 8 are placed at each side of the ends of the diaper by cutting into small pieces, positioning and laying down adhesives, synchronized with the advancement of the continuous strip 40 and operated in accordance with said rate "p." These different measures will be described in more detail in the subsequent description.

The affixed adhesives serve to position and to keep diaper 2 on the individual. In particular they are constituted by a composite strip of adhesives and siliconized protectors.

m) An anatomical cutting station 23 of nonwoven cloth 5 and watertight polyethylene film 6 at the crotch area of the diaper, in particular as illustrated in Figure 4c.

This station is constituted in a manner similar to that used for the cutting of absorbent element 10. It comprises in particular a knife cylinder 41 with cutting edges adapted to the cutting profile and an anvil cylinder 42 synchronized with the speed of the advancement of strip 40.

n) A folding station in C 24 and a compressor station 25 for shaping advancing continuous strip 40.

o) A final cutting station 26 towards which strip 40 is directed and in which the latter is cut to separate disposable diaper 2 thus-formed from continuous strip 40.

p) A removal station 28 of said flat products 2 thus-formed.

For example, diaper 2 is kept between two conveyors to be finally introduced to a chain pallet from which the products will then be taken to be wrapped.

Until now, the different stations which have been described are generally known to a person skilled in the art and they use conventional techniques. However, according to the state of the art, the products are inspected manually during their exit at station 26.

According to the present invention, to do away with manual quality inspection, the installation also comprises:

a) A means for controlling the advancement of the material-based cloth 3-8,

b) a means for controlling, in a synchronous manner, the advancing composite strip 40 thus formed, located at different stations of the work installation; control carried out in accordance with the parameters of shape and quality of the product to be obtained 2,

c) a means to mark, according to the rate "p," the obtained products nonconforming to said parameters.

d) a means to eject nonconforming marked products 2 obtained after they have been cut.

The different control measures will be clearly explained below and in particular will be allowed for detecting products that do not conform to one or more of the following criteria:

- products without adhesive and/or poorly positioned adhesives,
- products formed during transitory periods of the operation of the installation,
- products with an excessive thickness or double thickness in the external layers,
- products in which the elastic is poorly glued or not glued,
- products with excessive thickness and/or a local absence of materials,
- products not symmetrical in the transverse direction of said product,
- products with an absorbent element poorly centered in relation to the longitudinal ends of said product.

Thus, present installation 1 has the means 45 to control the presence of adhesives 8 after their application as well as their positioning.

These means 45 are in particular allowed for at the adhesive cutting station 22 and their operation is demonstrated in the view in Figure 6.

More precisely, after affixing the adhesives, one allows for a set of photoelectric cells 46, 47, placed on either side of the advancing strip 40 and likely to be hidden by the presence of adhesives 8. These photoelectric systems are advantageously constituted by fiber optics and optical detectors operating as a barrier or by reflection, techniques known to a person skilled in the art.

However, these means 45, and more particularly cells 46 and 47, act in a synchronous manner in relation to the advancement of the strip 40 to detect not only the presence of the adhesive but their good positioning. For this, one will use a synchronization mechanism 48 which will be related to the product rate "p."

In an advantageous application, these measures 48 are constituted, for example, by a rotating wheel whose revolution corresponds to the rate "p," bearing on its periphery a mark 49 which is detected, for example, by a proximity sensor 50 which delivers a reading synchronization beep for cells 46 and 47. Thus one detects the nonconforming products without adhesive and/or poorly positioned adhesives with a precision of more or less 10 mm.

Moreover, the detected nonconforming product still joined to either side of the previous product and the following product in strip 40 is stored by an electronic treatment circuit not represented in the figures, which delivers an ejection beep for the nonconforming product after its cutting phase at station 26.

Such a marking technique is traditional and well known to a person skilled in the art of the domain considered.

Therefore, at each synchronization beep delivered by mechanism 48, one controls the presence and the successive positioning of adhesives in accordance with the rate "p" and possible defects are stored.

Another cause for ejection of nonconforming products results from the transitory operation periods of said installation. Indeed, to implement an installation capable of delivering just 400 products/min, it is necessary to carry out different adjustments of the successive stations and to progressively accelerate the installation.

However, to detect and mark the nonconforming products formed during the transitory periods, said manufacturing installation 1 comprises the means for controlling the advancement speed of the continuous strip to systematically remove and eject nonconforming products formed during said transitory periods.

In addition, base materials 3-8 generally appear in spooled cloth, and to ensure good operation of the installation, it is important to control the advancement of the base material cloth.

In this respect, the installation of the present invention comprises the means for verifying the presence of the materials, measures generally based on photoelectric systems, floating rollers or other mechanisms, and well known to a person skilled in the art.

However, it should be noted that these controls are not at all systematically automatic and a certain number of them are able to remain under the control of the machine operator. This is the case with the engaging of pulp 3 or cellulose fiber net spools 4, which have relatively low advancement speeds.

On the contrary, nonwoven spools 5 and polyethylene film 6 are advantageously controlled automatically, and even their assembly is also mechanized.

In this respect, Figure 7 proposes a mechanism allowing assembly of nonwoven cloth 5 placed at work station 20.

More precisely, Figure 7 shows two nonwoven cloth 5 spools 51 and 52, for example, the first spool 51 being used as an example, and the cloth being directed by rollers 53, 54 towards it for use.

When a detector is set in motion by the end of this spool 51, the free end 55 of the spool 52 is thus joined to the nonwoven cloth which unwinds from spool 51, as the dotted lines show in Figure 7.

In this respect, end 55 advantageously has an adhesive area 56 applied by any mechanized means known in accordance with arrow 57 to join with the advancing strip. Next, a cutting mechanism 58 interrupts the continuity of cloth 5 from spool 51. Thus the latter is replaced by nonwoven cloth coming from spool 52.

It should be noted that this system can also be adapted to polyethylene film spools 6 at station 17.

During these assembly phases, it should be noted that there is excessive thickness of the final product either on external layer 5, or on external layer 6.

To ease this disadvantage and to eject the nonconforming products manufactured during this phase, which thus have an excessive thickness in the external layers, the installation of the present invention comprises measures to control the assembly of the base-material cloth when spools are changed.

For this these measures respond to the general control system of the installation and [the installation] stores, as

previously described, the nonconforming manufactured products to mark them and to eject them after the final cut from station 26.

In addition, in certain applications, flattened elastic 7 is laid out and then glued onto the watertight external layer in the lengthwise direction of advancing strip 40. To mark the nonconforming products to which the elastic has not been glued on watertight layer 6, present installation 1 comprises the means to control the spooling of the elastic strip and to detect its continuous return into the slubbing.

When there is a defect detection, the information is sent to the command system of the installation and it stores the place on advancing strip 40 where the return is produced to remove the nonconforming products after they have been cut as well as to attract the attention of the operator, who corrects the defect.

In addition, in the manufacturing installation of the present invention, to control the quality of the products obtained, it is worthwhile to verify the shapes of the manufactured products.

In this respect, said installation comprises the means for controlling, transversally to the direction of the displacement of the continuous strip 40, the thickness of said internal element 10 to detect and mark the nonconforming products with an excessive thickness and/or a local absence of absorbent material.

Indeed, the absorbent element is formed beforehand in the machine, from cellulose fibers of measured cloth. However, there might be a tearing away of a part of the element when cutting occurs and the part might accidentally fall on the absorbent element.

To carry out such control, one makes use of, as Figure 6 shows for example, at least three detectors, 59, 60 and 61, which

respectively gauge the thickness of the first lateral side of the pad, then its central thickness, and then the thickness of the second lateral side.

In this respect, one uses thickness gauges, whose operation is based on the disturbance of a light beam by the absorption of the material. These techniques are generally known to a person skilled in the art.

In the same manner as above, the position of the nonconforming detected products will be stored to respond and to remove them after their final cut.

Moreover, one can also use the same types of detectors to constitute the means to control the transverse shift of the final cut of said products in relation to the position of absorbent element 10 placed according to the rate "p" to detect and to mark the nonconforming products with the poorly centered absorbent element 10 in relation to the longitudinal ends of said product.

Indeed, such detectors can, on the one hand, calibrate the thickness of the pad, then the low thickness of the two external layers 5, 6 joined between them at the anatomical press 21, thus sufficing to synchronize the reading with the advancement of strip 40 to center the cut between the two consecutive absorbent elements 10.

One of the last quality controls worth realizing resides in the control of the symmetry in the longitudinal direction of the manufactured product.

In this respect, the present installation comprises the means to control the lateral shift of advancing strip 40 in relation to the positioning of the different work stations to detect and to mark the nonconforming products that are not symmetrical in the transverse direction of the strip. These

controls can be carried out by any type of proximity detectors or optical sensors controlling the centering of strip 40 in relation to an imaginary advancement axis.

Any symmetry defect thus causing an operator call to rework the positioning of the strip and a removal of the manufactured products during the defect phase, the products being marked and stored so that their removal can take place after their final cutting.

Figure 8 shows the different work stations placed at the end of the installation, that is to say, the final cutting station 26 and the removal station of conformed cut products 28.

However, between these two manufacturing installation stations of the present invention is an ejection station, for nonconforming products 27, essentially constituted by pivoting removable part 62 which in the first position allows the removal towards station 28 of conformed products and which in the second position opens a sort of trap door which directs nonconforming marked products 63 in Figure 8 towards a receptacle.

This trap door is, for example, operated by a screw jack 64 which is put into action by the general control system of the installation in accordance with the detection of nonconforming products up from this trap door.

In addition, according to another important characteristic of the present invention, the installation comprises measures for the cutting, positioning and laying down of adhesives, synchronized with the advancement of the continuous strip and operated in accordance with said rate "p," conceived to have a maximum effectiveness and therefore to avoid producing nonconforming products. These measures marked 22 in Figure 1 are shown in more detail in Figures 5a-5c.

The adhesive tape appears beforehand in the form of a continuous adhesive strip located, for example, on a spool not represented in the figure. This adhesive tape 8 is then directed towards the station for affixing adhesives 22 essentially constituted by:

a) a feed means which delivers the adhesive strip at a linear speed v_A, which is a function of the speed v_B of the advancement of composite strip 40 and the length "l" of said adhesive to be applied.

b) rotation support means 66 of part 67 of the strip thus delivered whose tangential speed v_C is greater than the linear feed speed v_A in advance of the strip 8, so that there is slight slippage between the adhesive strip and rotation support means 66 to favor the latter, said constant rotation means 66 and feed means 65 arranged to cooperate to prepare end 68 of the strip before it is cut,

c) a dynamic cutting means 69 of end 68 of adhesive strip 8, thus maintained and prepared, whose action is periodic, according to the rate "p" and controlled by the tangential speed v_C of the rotation means 66, suitable for making a clean cut from end 68 in accordance with the length "l" desired,

d) a dynamic transfer means 70 of the length "l" of the adhesive thus cut towards the continuous advancing strip 40, suitable for positioning said cut adhesive 71 on said strip 40 according to the rate "p,"

e) a means 72 to apply and join said cut adhesive 71 on said strip 40 cooperating in a synchronous manner with said transfer means 70.

According to an application of the present invention, the feed means 65 of adhesive strip 8 are constituted by at least 2

cylinders 73, 74, whose generators are sensitively fitted one against the other, and controlled by a part of an engine in a way that adhesive strip 8, carried along between the two cylinders 73, 74 displaces at said linear speed v_A.

Moreover, the cylinder 73 opposite the adhesive face of strip 8 is arranged and treated with an anti-adhesive so that no adhesion to the cylinder occurs. For example, it has a periphery cut in "diamond points;" moreover, the surface is covered with teflon. On the contrary, the cylinder 74 can be smooth because it faces the other non-adhesive face.

Moreover, another cylinder 76 of the same type as said cylinder 73 can produce better control.

Moreover, according to the application represented in Figure 5, the rotation means for maintaining and preparing end 68 of adhesive strip 8 to be cut and the dynamic means of transfer 70 of the length "l" of cut adhesive 71 appear in the form of an empty wheel 77 in which the inner area has been subjected to depressions and whose periphery is pierced with many orifices.

In this respect, the periphery is pierced with a first series of said first orifices 78 which start again uniformly along the periphery and which enable connection between the inner and the outer areas of wheel 77. Moreover, these orifices are controlled selectively on at least a first sector 79 of the periphery to substantially constitute said means of maintaining and preparing the end of the strip 66.

In addition, the periphery of wheel 77 is also pierced with one or numerous second orifices 80 which are distributed in an alternating manner in relation to said first series of orifices 78 and which also enable connection between the inner and outer areas of the wheel. Said second orifices 80 are also selectively

controlled on at least a second sector 81 contiguous to said first sector 79 in the rotation direction of the wheel to substantially constitute said means of transfer 70 of the length "l" of the cut adhesive 71.

Regarding the dynamic cutting means 69, they are in the case of Figure 5 constituted by a knife 82 whose cutting edge 83 is at least at a tangent at a point with the periphery of empty wheel 77 as shown in particular in figure 5b.

In addition, knife 82 is actuated by a rotational movement controlled by empty wheel 77 to form, by wheel-knife cooperation, said sharp cut of the adhesive at the tangential point.

Finally, means 72 for applying and joining said cut adhesive 71 are favorably constituted by a small pressure wheel 84, free on its axis, arranged to carry out a synchronized rotational movement with the speed of rotation N of empty wheel 77 around an axis 85 parallel to that of empty wheel 77.

In addition, when small wheel 84 is in opposition to empty wheel 77, the gap between them is such that the continuous composite strip 40 can move between them and be slightly compressed to join adhesive 71 on strip 40 in accordance with the rate "p," as shown in particular in Figure 5c.

It should be noted that two cutting mechanism operations are possible. On the one hand, one can arrange the cutting to always occur at the same place on empty wheel 77; on the other hand, one can arrange a different impact point on each turn of empty wheel 77.

In the case where one arranges cutting of the adhesive on each turn of the rotation means, that is to say of wheel 77, the periodic action of cutting means 69 of the speed of rotation N of constant rotation means 66. More precisely, in this case the two

speeds of rotation are for example identical, even for the tangential speed v_c of wheel 77 and that of cutting edge 83. In this case, the material for wheel 77 is advantageously chosen from special steels of very hard durability.

On the other hand, if one desires to use more conventional materials, to avoid marking wheel 77, one carries out adhesive applications at different places on the wheel, and there is cause to bring periodic action of the cutting means under control so that there is an adhesive application at each 7/8th turn of rotating means 77.

The mechanical operation for applying adhesive 22 is illustrated in particular in Figures 5a-5c.

Figure 5a shows the preparation of end 68 of the adhesive strip which is kept plated against wheel 77 by suction across orifices 78 and 80.

When the length "l" of adhesive 71 to be cut is correct, the strip is kept applied against wheel 77 by suction across orifices 78 and 80, the synchronized rotation of its knife 82 keeps its cutting edge 83 just tangentential to empty wheel 77 to carry out a sharp cut.

As Figure 5c shows, a piece of adhesive 71 is then transferred towards the advancing strip 40 in a synchronized manner in relation to the rate "p" through orifice 70, which is thus controlled selectively until application of the adhesive to strip 40. On the other hand, end 68 of the adhesive strip is prepared again for subsequent cutting, the latter is maintained by other orifices 78 which are thus controlled in sector 79, the first maintenance orifices thus being disconnected from the suction.

Advantageously the speed of rotation of constant rotation means 66 of the adhesive strip, that of transfer means 70, that of cutting means 69 and that of means 72 to apply and join said adhesive 71 to strip 40 is advantageously identical and such that one rotation of these different parts corresponds to the evolute of the rate "p."

Naturally, other cutting systems can be envisaged but it should be noted that this cutting mechanism is advantageous because it minimizes errors in adhesive application and consequently reduces the number of nonconforming products.

In addition, other applications of the present invention within the range of a person skilled in the art can be envisaged to constitute different specific means of the present invention without leaving the framework of the present invention.

Claims

1. The invention concerns the manufacturing installation (1) for flat-shaped products, in particular disposable diapers for babies or incontinent people, constituted from different successive in-line work stations (11-29) and comprising at least:

- a means for forming from various spooled base-material cloths (3-8), a continuous composite strip (40) with at least two external layers (5 and 6), namely one continuous layer (6) that is watertight to liquid and one continuous layer (5) with a comfortable feel on the skin and with a shaped element (10) that is permeable and absorbent, placed between the two said external layers (5 and 6), in accordance with a predetermined rate "p,"

- a means for at least partially joining the external layers (5 and 6) and said absorbent element (10) between them,

characterized by the fact that it comprises:

- a means for controlling the advancement of the base-material cloth (3-8),

- a means for controlling, in a synchronous manner, the advancing composite strip (40) thus formed, located at different work stations of the installation (11-29), in accordance with the parameters of the shape and quality of the product to be obtained (2),

- a means to mark, in accordance with the rate "p," nonconforming marked products (2) obtained,

- a means for cutting the continuous strip (40), thus formed in accordance with the rate "p," to produce the flat-shaped products (2),

- a means to eject, after they have been cut, nonconforming marked products (2) obtained.

2. Manufacturing installation in accordance with Claim 1, in which predetermined lengths of the adhesive tape (8) are applied on at least one of the two external layers of the strip (5 or 6) of the continuous strip (40), to each of its lateral sides, during its advancement and in accordance with a pre-established rate "p," characterized by the fact that it comprises the means (45) to check the presence of the adhesives (8) after they have been applied as well as positioned, in a synchronous manner in relation to the advancement of the strip (40), to detect or mark the nonconforming products (2) obtained without adhesive and/or which are poorly positioned.

3. Manufacturing installation in accordance with Claim 1, characterized by the fact that it comprises the means for controlling the speed of the continuous strip (40) to detect and

mark nonconforming products (2) obtained during transitory periods of operation of said installation (1).

4. Manufacturing installation according to Claim 1, characterized by the fact that it comprises the means for controlling the joining of the base-material cloth (5 and/or 6) when the spools are changed to detect and mark nonconforming products obtained (2) with an excessive thickness in the external layers (5,6).

5. Manufacturing installation according to Claim 1, in which flattened elastic (7) is applied then glued on the watertight external layer (6) in the longitudinal direction of the advancing strip (40), characterized by the fact that it comprises the means for controlling the unspooling of the elastic strip (7) and for detecting its continuous return into the slubbing to mark the nonconforming products (2) obtained in which the elastic (7) is not glued on the watertight layer (6).

6. Manufacturing installation according to Claim 1, in which the absorbent element (10) is formed from cellulose fibers of measured cloth, characterized by the fact that it comprises the means (59-61) to control, transverse to the displacement direction of the continuous strip (40), the thickness of said internal element (10) to detect and to mark the nonconforming products (2) obtained with an excessive thickness and/or a local absence of absorbent material.

7. Manufacturing installation according to Claim 1, characterized by the fact that it comprises the means for controlling the lateral shift of the advancing strip (40) in relation to the positioning of the different work stations (11-29) to detect and mark the nonconforming products (2)

obtained that are not symmetrical in the transverse direction of said product (2).

8. Manufacturing installation according to Claim 1, in which the length of the absorbent element (10) is less than rate "p," characterized by the fact that it comprises the means for controlling the transverse shift of the final cut of said products (2) in relation to the position of the absorbent element (10) placed in accordance with the rate "p," to detect and mark the nonconforming products obtained (2) with the absorbent element (10) poorly centered in relation to the longitudinal ends of said product (2).

9. Manufacturing installation according to Claim 1, in which the predetermined lengths of the adhesive tape (8) are applied to at least one of the two external layers of the strip (5 or 6) of the continuous strip (40), on each lateral side, during its advancement and in accordance with a pre-established "p," the adhesive tape (8) appearing beforehand in the form of a continuous adhesive strip applied for example from a spool, characterized by the fact that it comprises a means for cutting, positioning, and applying adhesives, synchronized with the advancement of the continuous strip (40) and controlled in accordance with said rate "p" constituted by:

a) a feed means (65) of the adhesive strip (8) delivering the strip at a linear speed v_A which is a function of the advancing speed v_B of the composite strip (40) and the length "l" of said adhesive to be applied,

b) a constant rotation means (66) for the part (67) of the strip (8) thus delivered whose tangential speed v_C is greater than the feed speed v_A of the adhesive strip (8) so that there is

slight slippage between the delivered adhesive strip (8) and the constant rotation means (66) to favor the latter,

- said constant rotation means (66) and advancing means (65) cooperating to prepare the end (68) of the adhesive strip (8) before the cut,

(c) dynamic cutting means (69) of the end (68) of the adhesive strip (8) thus maintained and prepared, whose action is periodic in accordance with the rate "p" and controlled by the tangential speed v_c of the constant rotation means (66), suitable for carrying out a clean cut of the end (68) in accordance with the length "l" desired, to successively form said predetermined lengths (71) of the adhesive tape.

10. Manufacturing installation according to Claim 9, characterized by the fact that the means for cutting, positioning and applying adhesives in addition comprise:

a) a dynamic transfer means (70) of the length "l" of the adhesive (71) thus cut towards the continuous advancing composite strip (40), suitable for positioning said adhesive (71) on said strip (40) in accordance with the rate "p,"

b) a means (72) to apply and join said adhesive (71) on said strip (40), synchronized with the advancement of the strip (40) and cooperating in a synchronous manner with said transfer means (70).

11. Manufacturing installation according to Claim 10, characterized by the fact that the constant rotation and preparation means (66) of the end (68) of the adhesive strip (8) to be cut and the dynamic transfer means (70) of the length "l" of cut adhesive (71) appear in the form of a same empty wheel (77) whose interior area is subjected to a depression, and whose periphery is pierced with a first series of said first orifices

(78), uniformly distributed and enabling connection between the interior area and the exterior of the wheel (77) through a selective control on at least one first sector (79) of the periphery of the wheel (77) to substantially constitute said means of constant rotation and preparation (66) of the end of the strip (68), and pierced with one or numerous said second orifices (80) distributed in an alternating manner in relation to said first series of orifices (78), enabling connection between the interior space and the exterior of the wheel (77) through a selective control on at least one first sector (79) of the periphery of the wheel to substantially constitute said constant rotation and preparation means (66) of the end of the strip (68), and pierced with one or several said second series of orifices (78), enabling connection between the interior space and the exterior of the wheel (77) by a selective control on at least a second sector (81) contiguous with the said first sector (79), to substantially constitute said transfer means (70) of the length "l" of the cut adhesive (71).

12. Manufacturing installation according to Claim 9, characterized by the fact that the advance means (66) of the adhesive strip (8) constituted by at least two cylinders (73,74) whose generators are sensitively fitted one against the other, controlled by an engine part in such a way that the adhesive (8) carried along between the two cylinders (73,74) is displaced by a linear speed v_A, the cylinder (73) opposite the adhesive face (75) of said tape (8), arranged and anti-adhesive treated so that there is no adhesion to the cylinder (73).

13. Manufacturing installation according to Claim 11, characterized by the fact that the dynamic cutting means (69) are constituted by a knife (82) whose cutting edge (83) is at least

at a tangent to one point on the periphery of the empty wheel (77) to form said sharp cut of the adhesive at this point and is actuated by a rotational movement controlled by the empty wheel (77).

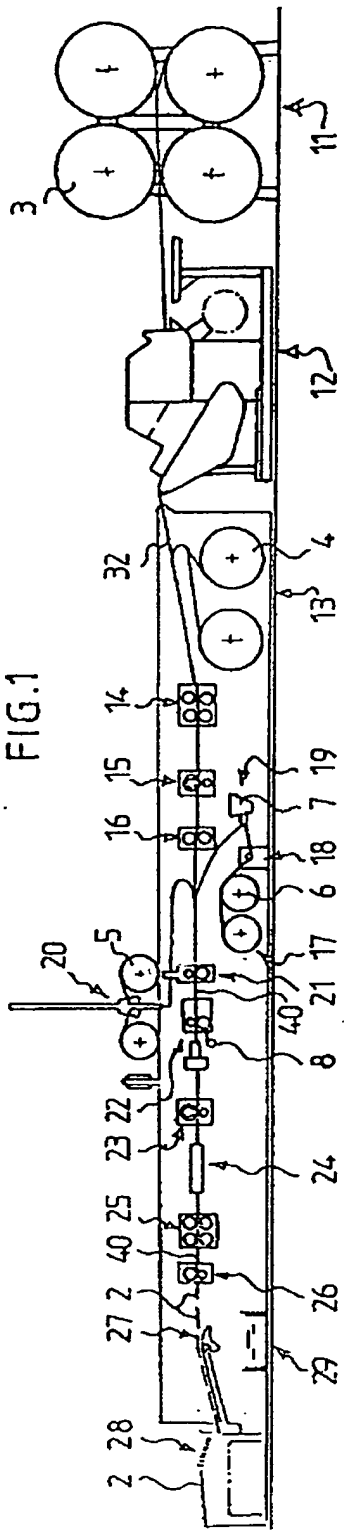


FIG.1

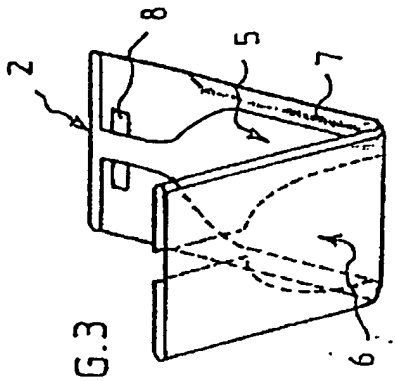


FIG.3

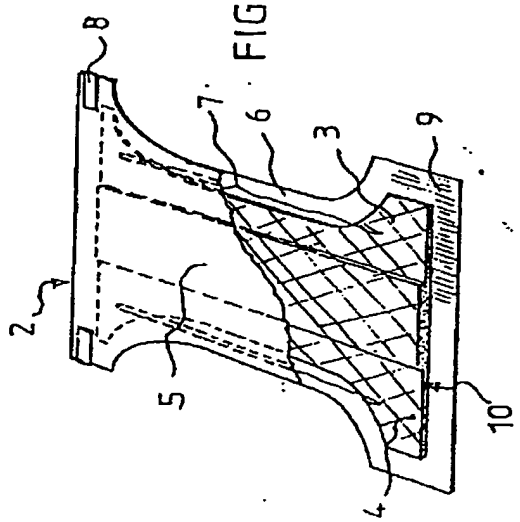


FIG.2

FIG.4a

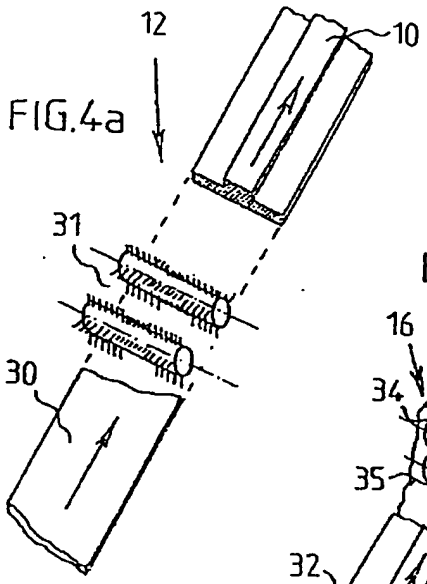


FIG.4b

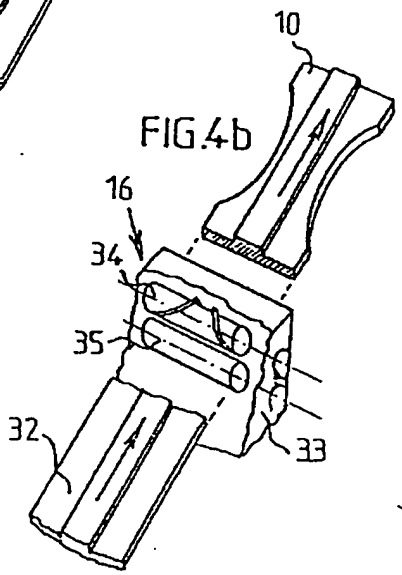


FIG.4c

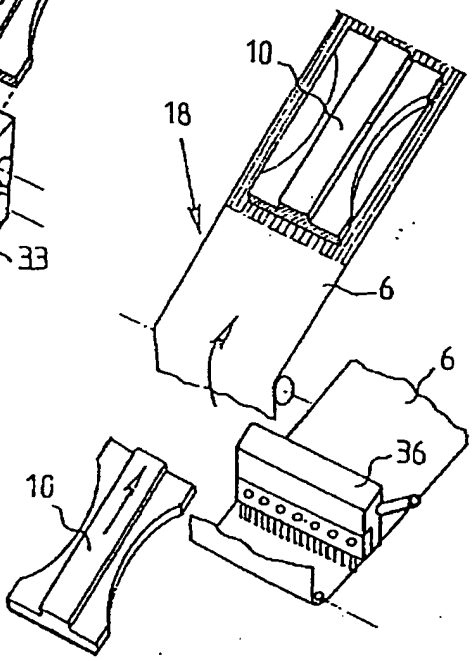


FIG.4d

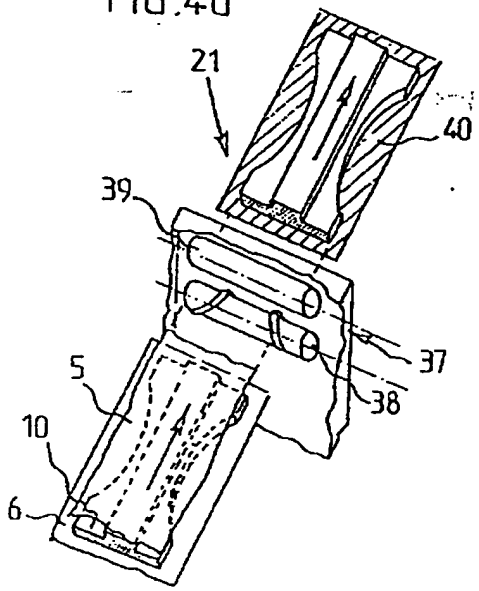
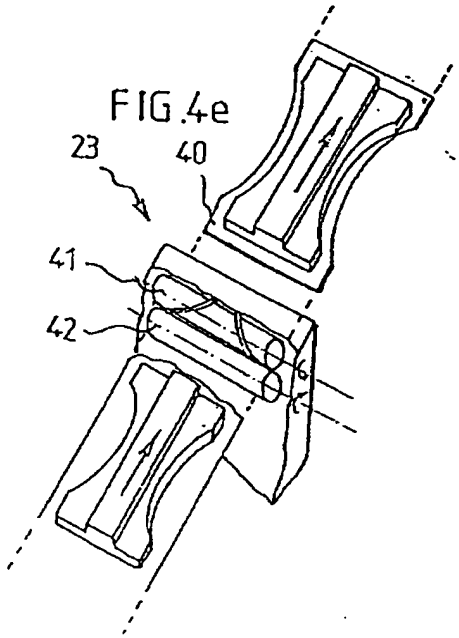


FIG.4e



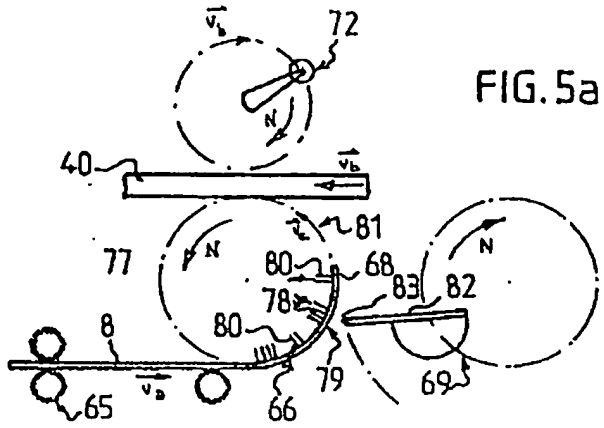


FIG.5a

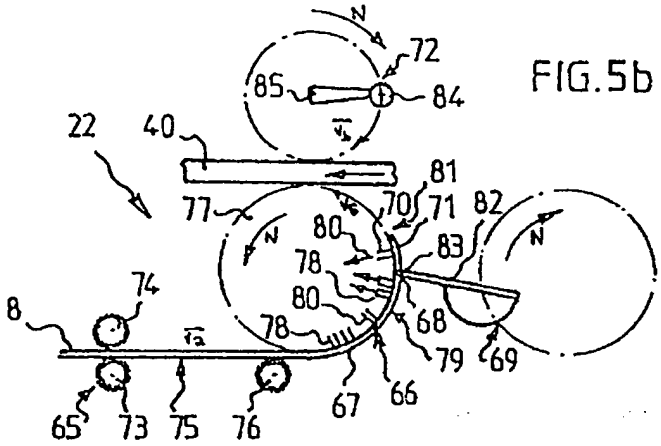


FIG.5b

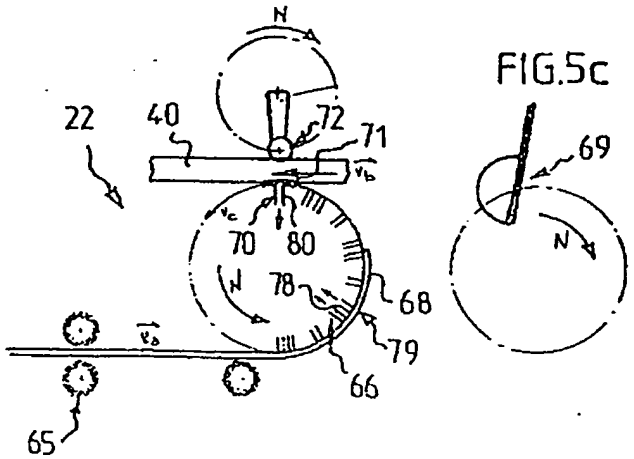


FIG.5c

FIG.6

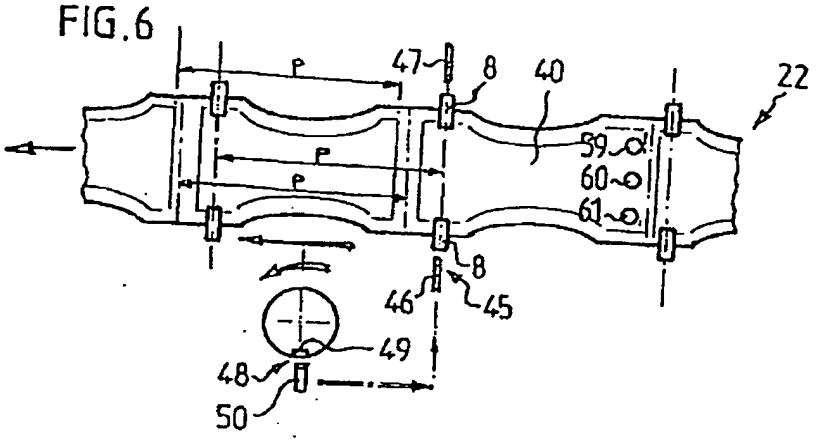


FIG.8

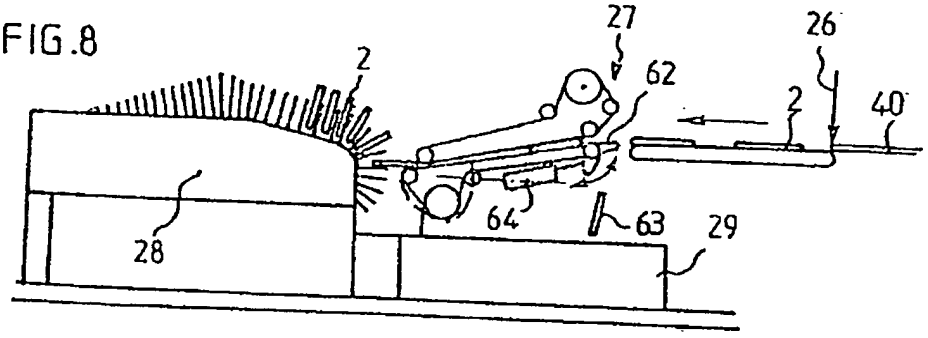
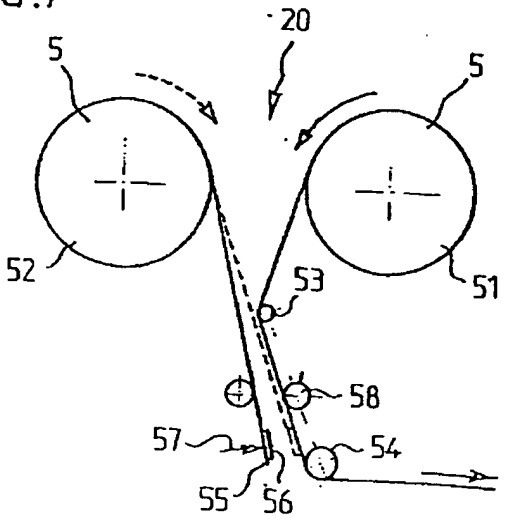


FIG.7



European Patent Office

Application Number

EP 87 44 0014

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl[5])
Y	US-A-3 661 680 (RIEGEL TEXTILE CORP.) * Column 4, paragraph 3; column 6, lines 3-75; column7, entire; column 8, paragraph 1; column 9, lines	1	A 41 B 13/02
A	15-75; column 10, paragraph 1; figures ---	7	
Y	US-A-4 331 501 (RIEGLE TEXTILE CORP.) * Column 5, lines 8-68; column 6, lines 1-48* ---	1	
Y	FR-A-2 274 241 (RIEGEL TEXTILE CORP.) * Page 10, entire; page 11, paragraph 1; pages 13-19, entire; page 20,		
A	paragraphs 1,2; figures * ---	7,8	
Y	US-A-2 675 916 (INTERNATIONAL CELLUCOTTON PRODUCTS CO.) *Column 1, paragraph 2; column 2, paragraphs 2,3; column 3, lines 6-75; column 5, lines 2-33; column 13, lines 18-47; claims; figures*	1	
A	US-A-3 981 763 (RIEGEL TEXTILE CORP.) *column 3, lines 35-3368; column 4- column 12, entire; column 13, lines 1-39; figures*	1,2,9-13	
A	FR-A-2 240 174 (JOHNSON & JOHNSON) *Page 5, lines 1-32; page 8, lines 17-40; page 9, entire; page 10, lines 1-34, figures*	1,9-13	TECHNICAL FIELDS SEARCHED (Int Cl[5]) A 41 B A 61 F

The present search report has been drawn up for all claims.

Place of search	Date of completion of the search	Examiner
The Hague	June 1, 1989	GARNIER F.M.A.C.

CATEGORY OF CITED DOCUMENTS

X: Particularly relevant if taken alone.
Y: Partidularly relevant if combined with another document of the same category.
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P: Intermediate document

T: Theory or principle inderlying the invention.
E: Earlier patent document, but published on, or after the filing date.
D: Document cited in the application.
L: Document cited for other reasons.

&: Member of the same patent family, corresponding document